

1
2 ARCHITECTURES FOR HIGH-RESOLUTION PHOTOMASK PHASE METROLOGY
3

4
5 Inventors: J. J. Jacob and A. J. Merriam
6
7
8

9 ABSTRACT
10

11 We disclose several instrument architectures for the measurement of arbitrary phase retardation
12 on advanced lithography photomasks. These architectures combine traditional interferometric
13 techniques with high-magnification UV microscopy. Features are interrogated using a
14 multitude of phase probes, formed by a imaging a number of variable apertures back-
15 illuminated by phase-coherent beams, onto the surface of the photomask with a given
16 demagnification. The size, spacing, and orientation of the phase probes may be adjusted to suit
17 photomask feature geometries. Means are provided to vary the relative optical phase between
18 the phase probes. These phase probes both reflect from and transmit through the photomask;
19 the stationary, non-localized interference fringes, formed in the regions of phase probe electric
20 field overlap, contain information on the optical path difference between the two probes. The
21 spatial resolution of these measurements is limited only by the resolution limit of the UV
22 microscope, which may significantly exceed the capability of existing tools.
23